voluntary muscles of Crustacea and Insecta. In the further researches of M. Lebert (Annales Sci. Nat. 1850, t. xiii. p. 161) he observes that there is nothing extraordinary in the discovery of transversely striated muscular fibre in Polyzoa (*Eschara*) by Milne-Edwards, and in *Actinia* by Erdl, since "the further we have pursued the study of the comparative histology of muscular fibre, the more convinced we have become that transversely striated muscular fibre is to be found in a large number of animals of very inferior organization, without regard to their more or less advanced position in the animal kingdom."

Striated muscular fibre has lately been shown to exist in the "tail" or appendix of *Appendicularia* by Moss (Trans. Linn. Soc. vol. xxvii. p. 300). It was already known to exist in *Salpa* (Eschricht, Ov. Salperne), in the articulated Brachiopoda (Hancock, Trans. Roy. Soc. 1857, p. 805), and in *Pecten* (Lebert, Annales Sci. Nat. 1850, sér. 3. t. xiii. p. 166; and Wagner, Lehrb. d. vergleich. Anat. 1847, t. ii. p. 470), as well as in *Eschara* (Milne-Edwards, Annales Sci. Nat. sér. 2. t. iv. p. 3). I believe, however, that this is the first instance in which it has been shown to exist in the class Gasteropoda; and this, as well as the rarity of such cases among the lower invertebrates, is a sufficient apology for bringing forward such an isolated fact. Other duties have not yet permitted me to determine whether this phenomenon is constant throughout the genus, or whether it does or does not occur among allied genera.—*Silliman's American Journal*, Feb. 1871.

On Bud-formation in Gymnocladus *and other Plants.*

By Thomas Meehan.

The author said that last year he had called the attention of the Academy to the fact that *Gymnocladus* and some other plants had a series of buds, not in the usual order of *phyllotaxis*, accordant with the leaves, as we have believed axillary buds ought to be, but in a direct line one above another, and that in these cases the upper bud, the one the furthest removed from the axil, was the strongest bud. He had overlooked the fact, long known to botanists, until pointed out by Dr. Engelmann, that *Lonicera* had this longitudinal string of buds; but in this case the largest bud was the one nearest the axil. He had since noted that these buds all followed the same law in this, that it was the large buds which had a flower-producing character, while the small ones were those which continued the axial growth.

By the help of this last observation, he was now able to explain some facts in Solanaceous plants which he believed had not hitherto been understood. It was well known that many of these had a habit of producing their flower-scapes at varying positions between the nodes, and not at the nodes, as is usual with most flowering plants. He exhibited specimens of the common cherry tomato, in which a few of the flower-clusters sprang apparently opposite to a node, but the majority were at least one-fourth of the way down to the node below,—also other species of the genus, in which the flower-

peduncle pushed out almost down to the lower axil. This was especially the case in some egg-plants, wherein the leaf-axil, the axillary bud, and the bud producing the flower-peduncle were close together in a direct line, as in *Gymnocladus*, before noted. The point to which he wished the particular attention of the members was that this internodular flower-bud really belonged to the system of buds apparently originating at the node below.

He then showed that the flowering character of *Solanum* had a numerical law of its own. Every third node produced a flower-spike or cluster. The node next following the flower had barely the rudiment of an axillary bud; the second one had a stronger bud; the third had a bud which in the tomato and egg-plant pushed again into axillary growth, and had the extra bud beyond, before noted, the flowering one. Other solanaceous plants had similar characters, which, unless we remembered what we had learned in these common Solanums, we might not understand. For instance, in *Nycterium violaceum* the two nodes between the flowering one approached very close together, so as to appear nearly opposite, but still one axillary bud stronger than the other. In *Datura* all three nodes approached and formed a sort of fascicle with the flower proceeding from the irregular centre of the mass.

He now exhibited some specimens of the common poke-weed (*Phytolacca decandra*), and showed that the inflorescence was exactly on the same law. The flower-raceme only appeared at every third node, and sometimes was as much as a quarter of an inch above the node. It was directly in a line with the lower bud, as in the cases of *Gymnocladus*, *Lonicera*, *Solanum*, &c.; and there was no difficulty in assuming that the flower-spike had really belonged to the lower system, just as in the other cases. The ratio of vigour in the axillary buds was just the same. The leaf opposite to or near by the raceme had scarcely any axillary bud, the next stronger, the next strong enough to push into a secondary axillary growth, and then the flower above this. In this we saw *Phytolacca* to have the same characters as Solanaceous plants. The seeds of *Phytolacca* were of very similar structure to *Solanum*; and it had many other characters in common. He was not prepared to speak positively without further investigation, but thought it quite likely, in spite of the hypogynous flower, *Phytolacca* would be found more nearly related to Solanaceæ than to Chenopodiaceæ, near which it was now placed.

He then exhibited some shoots of grape-vine, and said that Dr. Engelmann had pointed out, when at the Academy last year, that there was some numerical order in the tendrils of grape-vines. In the specimen he exhibited every third node had no tendril; but he had seen some grape-vines in which as many as eight nodes with tendrils had followed one another. In the mature wood, however, those without tendrils perfected the strongest buds. But he had found in the allied genus *Ampelopsis* a nearly regular system of buds and tendrils. In *A. hederacea*, the common Virginia or five-fingered creeper, the strong shoots running up a wall or tree had at every third node a strong axillary bud, *without any tendril*, while the two

intervening nodes had tendrils *without axillary buds.* Occasionally, but very rarely, two successive nodes would have axillary buds, in which case the lower one would be smaller, and have also a small tendril on the opposite side. *Ampelopsis Veitchii* had the same character. He had attempted to propagate this by using nodes from which the tendrils pushed as single bud-cuttings, but failed to get any development from the axils. He believed they had not a trace of a bud in even the most rudimentary state. It had been said, in Darwin's paper on motion in tendrils, that the gland on the end of the tendril did not develope itself until it approached the object it was to cling to. In *Ampelopsis Veitchii* they developed before this, in the shape of small globes, looking like rudiments of the same flower which ultimately appeared. In fact, tendrils here were incipient flower-branches, as any one could see by tracing the common *Ampelopsis hederacea* up to its final flowering condition, when, the axial growth ending in a terminal bud, instead of the usual lateral tendril, it seemed to erect itself and bear flowers. It would seem as if it were only the elongation of the axis, demanding and drawing to itself nutriment which would otherwise go into the tendril, which made it a tendril, and not a flower-shoot.

He did not, however, intend at this time to attempt any explanation of these series of observations. He thought there was nothing in any known law of phyllotaxis which would explain them, and that by following them up matters of much interest to botany might be evolved. But, as he might have more to say about it some day, and winter was approaching, he thought to call the attention of the Academy to the facts, so that those interested might examine them for themselves before the frost destroyed the specimens.—*Proc. Acad. Nat. Sc. Philad.* Sept. 20, 1870.

On the Flowers of Aralia spinosa, *L., and* Hedera helix, *L.*

By Thomas Meehan.

The study of *Aralia spinosa*, L., affords some interesting facts which do not seem to have attracted the attention of other observers.

In Dr. Gray's indispensable 'Manual of Botany,' it is said to be "more or less polygamous." I have had many specimens under my daily observation this season, from the earliest opening till the last blossom appeared, and find that it is much more nearly monœcious than the above quotation would imply.

There are three different sets of flowers, corresponding to the thrice-compounded branchlets of the large panicle. When the flower-scape elongates, it seems suddenly arrested at a given point, and a very strong umbel of *female* flowers appears at the apex. A great number of secondary branches appear along this main one, and they also suddenly terminate each with an umbel of female flowers. From these secondary branches a third series appear; and these flowers are well filled with anthers that are abundantly polliniferous. The female organs of these flowers of the third class, however, are defective, as only a few bear capsules, and in these a large portion of the seeds have no embryos. The polygamous character is confined